Method and System for Adaptive Direct Volume Rendering

ABSTRACT OF THE INVENTION

An adaptive image volume rendering system first fragments a 3-D dataset into multiple sub-volumes and constructs an octree structure, wherein each sub-volume is associated with one node on the octree. The system then establishes a 2-D image plane and selectively launches a plurality of rays towards the 3-D dataset, each ray adaptively interacting with a subset of the sub-volumes. The ray energy reflected by each sub-volume is estimated using a modified Phong illumination model, constituting a pixel value at the ray origin on the 2-D image plane. Finally, the system interpolates pixel values at a plurality of selected locations and generates a 2-D image of the 3-D dataset.